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Method for producing plant protection or plant-strengthening agent for controlling bacterial and/or fungal plant diseases, in particular against fire blight

Such methods for producing plant protection or plant-strengthening agent for controlling bacterial and/or fungal plant diseases, in particular for controlling fire blight, are known in a variety of forms and embodiments.

It is known that antagonistic microorganisms are employed more and more often. Besides bacteria such as, for example, *Bacillus thuringiensis*, which are used as insecticides, or *Bacillus subtilis*, which are used in soil treatment agents and seed-dressing products, there are also preparations comprising fungal spores and yeast cells.

A known example is the plant protection production Contans, which comprises spores of *Coniothyrium minitans*, or various preparations with the yeast *Trichoderma harzianum*. These preparations are essentially applied to the soil or incorporated into the soil or garden compost. These agents are not suitable for floral application.

The disadvantage is that fire blight of pome fruit is caused by the bacterium *Erwinia amylovora*. It is controlled for example by plant management methods and sanitation, for example by grubbing up the plants, for example reduction of the inoculum. Fire blight is furthermore controlled by means of plant protection agents. Frequently, treatments with

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antibiotics are carried out during flowering. Here, the active substance streptomycin, whose activity is well known, is used. However, this plant protection agent has recently been banned, or will be banned all over the EU. The active substance streptomycin, which the plant protection agent plantomycin contains, has been used successfully in the United States since the 70s; however, problems with resistant pathogens are on the increase, which is undesired.

Also known are treatments with copper during flowering, for example with funguran, cuprozin; however, they must not be carried out in the case of dessert fruit as the result of phytotoxic effects. Moreover, the license of this agent has already expired in December 2002.

Moreover, there have been attempts to apply antagonistic microorganisms to the flowers of fruit trees and thus to inhibit the growth of pathogen and thus to prevent infection. Various bacteria such as *Pseudomonas fluorescens*, *Pantoea agglomerans*, *Bacillus subtilis*, *Rhizobium aquatilis*, have been employed in this context. In some cases, saleable products were developed with these bacteria, such as, for example, the products Blight ban and Serenade in the USA and BIOPRO in Germany. The effects of these products are very dubious to date, and their use is very limited.

It is therefore an object of the present invention to provide a method for producing plant protection agent for controlling bacterial and/or fungal plant diseases, in

particular fire blight, and a plant protection agent and its use which overcome the above-mentioned disadvantages and which can be employed highly effectively for a multiplicity of plants, in particular fruit plants. In this context, it is intended that the plant protection agent can be applied to the diseased plants in sprayable form.

The object is achieved by the characterizing features of patent claim 1 and the features of the dependent patent claims.

The present invention creates a plant protection product or plant-strengthening agent in which fungal structures which are capable of multiplication, preferably yeast cells and/or fungal spores, are introduced or added into an acidic application within a pH range of from 3 to 6, preferably from 3.6 to 4.0.

A product which is resuspended in water for the treatment of plants consists of whey powder, disodium hydrogen phosphate, citric acid and blastospores of strain CF10 of the species *Aureobasidium pullulans* and yeast cells of strain MSK1 of the species *Metschnikowia pulcherrima*. This product is particularly suitable for the control of fire blight.

The efficacy of the novel plant protection or plant-strengthening agent has even outperformed the antibiotic plantomycin.

In this context, it is possible to use fungal structures which are capable of multiplication, such as spores, conidia and budding yeast cells of filamentous fungi and yeasts which are preferably added to the spray mixture within a pH range of from 3 to 6. In connection with the present invention, it has been shown as particularly advantageous that the use of fungal spores or yeast cells in admixture with organic or inorganic acid results in a specific increase in activity in the control of fire blight. In particular, adding the fungal spores or yeast spores to an acidic environment which can be sprayed, or spray mixture, results in an increased efficacy in the control of bacterial and/or fungal plant diseases. The pathogens causing fire blight can be controlled very efficiently and with very low outlay in this manner.